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CENTRAL INTELLIGENCE AGENCY
INFORMATION FROM
FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT
CD NO.

50X1-HUM

COUNTRY	USSR	DATE OF INFORMATION	1951
SUBJECT	Economic; Technological - Automobile industry, fuels		
HOW PUBLISHED	Monthly periodicals	DATE DIST.	20 Jun 1951
WHERE PUBLISHED	Moscow	NO. OF PAGES	3
DATE PUBLISHED	Jan, Feb 1951		
LANGUAGE	Russian	SUPPLEMENT TO REPORT NO.	

THIS IS UNEVALUATED INFORMATION

SOURCE Periodicals as indicated.

SOVIET TESTS SHOW MOTOR ADJUSTMENTS SAVE GAS; SULFUR IN FUEL SPEEDS WEAR ON MOTOR

CORRECT MOTOR ADJUSTMENT LOWERS FUEL USE -- Moscow, Avtomobil', Jan 51

Tests by VNIITNFFTI (All-Union Scientific Research Institute for the Transport, Storage, and Use of Petroleum Products) and the First Taxi Park, Administration of Automobile Passenger Transport, Moscow Soviet, showed that fuel consumption depends on adjustment of the carburetor and the ignition system by the individual driver.

New M-20 Pobedas showed as much as 25-percent variation in fuel consumption. Since the most common reasons for increased fuel consumption were carburetor and ignition troubles, fuel economy depends on the condition of these units. The allowance on carburetor-jet output is plus or minus one percent, and according to GOST, the allowance on carburetor-fuel output in the factory test should be within 3 percent. However, testing of jet output at constant pressure does not provide a definite indication of fuel consumption, since the flow of fuel from the carburetor, when it is mounted on the motor, takes place under varying suction pressures. Moreover, there can be deviations in the position of the jet and the spray nozzle, depending on the quality of the machining, in mounting the jet in the carburetor. This results in differing fuel outputs. Different fuel-consumption results were obtained by running an M-20 Pobeda with a number of standard carburetor jets, all of which had a fuel output within the standard limits.

Since the carburetor has several jets, each of which has an effect on the carburetor's performance, the carburetor as a whole, in spite of its conformity to technical standards, can have deviations that will be reflected in motor power and fuel consumption. An M-20 Pobeda tested with a number of standard carburetors gave differing fuel consumption results. The same car developed different speeds when tested with a number of carburetors of the same model. Similarly, mounting the same carburetor on different cars of the same make will give different fuel consumption results. Thus, it is not only carburetors that have individual characteristics, but also motors.

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The fuel economy of an automobile can be increased by picking the most suitable jet or set of jets from the standard parts available for a given carburetor, and also by the choice of the correct carburetor for a given automobile.

Under certain operating conditions, fuel consumption can be reduced by installing a carburetor jet with less than standard output and then adjusting the motor.

If the angle of advance of the ignition system is less than that which gives maximum economy at a given rate of speed, the consumption of fuel increases by as many percent as the angle of advance decreases. For example, if the motor consumes 20 liters of fuel per 100 kilometers when the ignition advance is 30 degrees, the consumption of fuel will increase 10 percent when the angle of advance decreases to 20 degrees. Along with the functioning of the automatic regulator, the initial angle of advance of the ignition has an important effect on fuel consumption. The initial angle of advance depends on the quality of fuel being used.

The operation of the ignition advance depends on the quality of the assembly of the ignition system, the individual characteristics of the motor, and also on driving conditions. The angle of ignition advance may deviate from the optimum in a running motor, even though the distributor is in good technical working order.

Mass tests were conducted to determine how accurately ignition systems were adjusted in large automobile managements. Only 12 percent of the automobiles tested had their ignition systems correctly adjusted; among the remaining 88 percent, deviations from the norm varied from minus 15 degrees to plus 20 degrees. Along with tests of initial ignition adjustment, tests were made of the functioning of ignition-advance mechanisms. Correct adjustment of ignition systems changed the octane ratings of fuels required to operate motors.

Prior to adjustment of the ignition systems, the difference in octane ratings required for a group of four motors was 25 units; after adjustment the difference was 12 units. It must be noted that there were great deviations in the octane ratings of the fuel after adjustment of the ignition systems, despite a considerable change in the character of the curves of fuels of the required antiknock rating. For instance, while a fuel with an octane rating no lower than 88 was required to run one motor at 1,200 revolutions per minute without knocking, a fuel with an octane rating of only 76 ran another motor at 1,700 revolutions per minute. Thus, along with the individual variations in the work of the ignition-advance mechanism, there are also deviations in the motor itself which determine the required antiknock rating of the gasoline.

To carry out the individual adjustment of the fuel and ignition systems, a special apparatus is needed to measure the consumption of fuel at various speeds and under different loads. This is a testing stand which simulates various load and speed conditions and measures fuel consumption. Supplying large automobile managements with these stands is an urgent problem. Construction of such stands will make it possible to organize permanent and mobile stations for individual automobile adjustment, effecting a considerable saving of fuel in motor transport. Use of the stand at the First Taxi Park in Moscow gave good results, a saving of 3 percent under winter driving conditions.
-- A. Serov, engineer

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SULFUR IN GASOLINE IS SOURCE OF CORROSION -- Moscow, Avtomobil'naya i Traktornaya Promyshlennost', Feb 51

Interest in the effects on motors of sulfur in fuel has arisen in recent years because of the necessity of using petroleum with a high sulfur content. Sulfur in fuel acts on the motor in two phases. Before combustion, sulfur compounds corrode pipe lines, carburetor, float, jet, inlet valve, and other parts of the fuel system. After combustion, sulfurous anhydride, SO_2, and sulfuric anhydride, SO_3, corrode cylinder walls, pistons, and parts of the crankcase.

Part of the sulfurous anhydride, together with the water vapors and the CO_2 formed as a result of combustion of the hydrocarbons, penetrates the crankcase, and uniting here with condensed water or being oxidized by the oxygen in the air, form sulfurous and sulfuric acid, which corrode metal as much as their anhydrides.

The content of sulfur compounds in petroleum of various origins varies from 0.01 to 6 percent.

Hydrogen sulfide acts on iron, lead and its alloys, antimony, copper and its alloys, mercury, and silver. The mercaptans corrode cobalt, nickel, lead and its alloys, antimony, and copper and its alloys.

The corrosion of metals by fuels containing active sulfur considerably increases if even a minute amount of moisture is present. Therefore, the presence of active sulfur in fuels is not permissible even in the smallest quantities. However, sulfur compounds in the form of water-soluble acids (sulfuric) and also in the form of sulfonic acids and acid esters of sulfuric acid may exist in fuel if it has not been satisfactorily refined, and especially if it has not been satisfactorily neutralized at the time of sulfuric-acid treatment.

A test-stand run of new four-cylinder motors using seven types or mixtures of gasoline with sulfur content ranging from 0.006 to 0.357 percent showed that high sulfur content resulted in increased wear on cylinders, piston rings, and valves, and increased carbon deposits and corrosion. The sulfur content of the fuel was reflected in thickening of the oil and also in the sulfur content of the used oil. Horsepower fell 3, 7.5, and 14.5 percent after 220 hours of operation with fuels containing 0.1, 0.2, and 0.357 percent sulfur, respectively.

This test showed that the quantity of sulfur in gasoline should be drastically limited. Sulfur in gasoline, beside causing the defects listed above, causes overconsumption of ethyl fluids in ethylated gasoline, since it lowers the octane rating of gasoline. -- N. S. Semenov, NAMI (Scientific Research Automobile and Automobile-Motor Institute)

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